A NEW FOSSIL STICKLEBACK FISH FROM NEVADA.

By Oliver P. Hay.

Of the American Museum of Natural History, New York city.

The writer has received from the Geological Department of the U. S. National Museum for description four specimens of small fossil sticklebacks that were collected by Mr. Thomas H. Means from the Lahontan beds, through which the Truckee irrigation canal was being cut, three miles southwest of Hazen, Nevada. These fishes are inclosed in a very white clay which splits readily into thin laminæ.

All the specimens belong to a single species, and this is a member of the genus *Gasterosteus*, a genus containing a number of small spiny-rayed fishes known as sticklebacks. These inhabit the salt and brackish waters of the coasts, as well as some of the fresh-waters, of Europe and North America. One species, *G. cataphractus*, is found along the Pacific coast from San Francisco to Alaska. Another, *G. williamsoni*, occupies fresh-water streams in the interior of southern California. A subspecies of this form, *G. williamsoni microcephalus*, inhabits streams and brackish waters along the coast from Alaska to Lower California.

The facts regarding the sticklebacks of the Pacific region are obtained from Jordan and Evermann's Fishes of North and Middle America.

The fishes sent me are closely related to all the species just mentioned; also to *G. bispinosus*, of eastern America, and to *G. aculeatus*, of Europe. The fossils, however, present characters of subspecific value.

GASTEROSTEUS WILLIAMSONI LEPTOSOMUS, new subspecies.

The first of the specimens (Cat. No. 5386, U.S.N.M.), the type, displays the nearly complete skeleton (fig. 1). Most of the important bones of the head can be identified. The mouth gapes and displays traces of teeth. The anterior dorsal spine is missing; the second and third are represented by impressions in the clay. The dorsal soft rays are disturbed and some are missing. The pectoral fin is preserved and

the rays are 10 mm. long. The ventral fins are gone, but a portion of the ventral plate is present. Its outer surface was sculptured. The anal fin is disturbed and a part missing. The caudal is preserved. The length of the fish from the snout to the base of the caudal is 51 mm.; the length of the head, 14.5 mm.; the depth of the body, 9.5 mm. There is no trace of either lateral armor or a caudal keel.

FIG. 1.—SKELETON OF GASTEROSTEUS WILLIAMSONI LEPTOSOMUS. (TYPE) · 1½.

The second (Cat. No. 5387, U.S.N.M.) lacks most of the head (fig. 2). The length from the shoulder girdle to the base of the caudal is 38.5 mm.; the depth is 10 mm. The first dorsal spine is 3 mm. long; the second 5 mm.; the third is short and curved. There are 10 soft dorsal rays. The ventral spines have a length of 7 mm. and the ventral plates a length of 11 mm. The anal spine is short and curved, and there are counted 9 soft rays, with an interhaemal spine for a tenth.

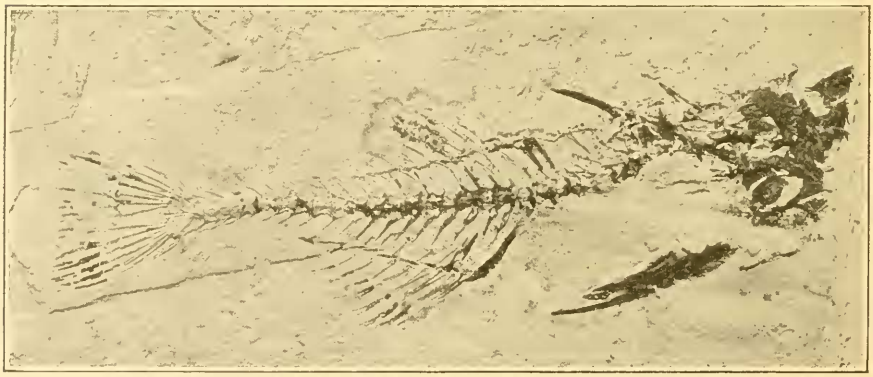

FIG. 2.—NEARLY COMPLETE SKELETON OF GASTEROSTEUS WILLIAMSONI LEPTOSOMUS. ×1½.

Below and in front of the second dorsal spine are remains of three plates belonging to the lateral armor, but there is no indication of the caudal keel.

The third (Cat. No. 5388, U.S.N.M.) presents the head, the second dorsal spine, and a portion of the ventral plate. The spine is 4 mm. long. The ascending process of the ventral plate is sculptured.

The fourth (Cat. No. 5389, U.S.N.M.) furnishes the body behind the fronts of the dorsal and anal fins (fig. 3). Only 8 soft rays appear in the dorsal and anal fins; but evidently at least one in each is missing.

The slenderness of the body (depth in the length 5 times) differentiates this fish from all the others except *G. bispinosus*, in which the depth is 5.5. In all the others the depth does not go above 4 times in the length. From the species *G. bispinosus* and its subspecies *cuvieri* our fossil differs in the fin formula, that of *G. spinosus* being D. II, I, 12; A. I, 8.

It is evident that the Lahontan fishes are most closely related to the typical form of *G. williamsoni*, the species now living within a few hundred miles of the Lahontan beds. The fin formula of this species differs only in having 8 soft anal rays. However, the body of the fossil form is slenderer, the second dorsal spine is longer, entering the distance from the snout to the pupil once, instead of 1.5 to 2 times. The first dorsal spine of the fossil appears to be much shorter than in the living species considered. The ventral spines seem to be longer than

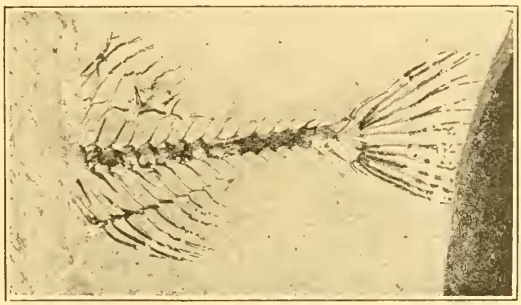

FIG. 3.—POSTERIOR PORTIONS OF SKELETON OF GASTEROSTEUS WILLIAMSONI LEPTOSOMUS. ×1½.

in *G. williamsoni*, and the ventral plates are considerably longer than the snout and the orbit taken together; the snout and orbit being 7 mm. long, the plates 11 mm.

From *G. williamsoni microcephalus* the fossil form is distinguished by several characters besides the slenderer body. There are more rays in the anal fin and the ventral plates are longer.

In the typical form of *G. williamsoni* it is only in occasional individuals that the lateral armor is found, and in these only 2 or 3 plates appear on each side. In *microcephalus* there are usually 5 or 6 plates; but there may be as many as 26. On the other hand, individuals are sometimes found that are wholly devoid of lateral armor.

The presence of this fossil stickleback in the Lahontan beds, related as it is to *G. williamsoni*, appears to indicate an age not older than Quaternary, and that the beds were deposited in fresh rather than in salt or brackish water.

Excepting a specimen supposed to belong to *G. bispinosus*, found in the Pleistocene of Canada by Sir William Dawson, no fossil stickleback has hitherto been reported.